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(54) **Spinal fixator**

(57) A spinal fixator is in the form of a turnbuckle the end sections of which terminate as circular flat plates 4 and 5 formed with upwardly and downwardly protruding spikes 6 and 7 for engaging in the bone of respective vertebrae V1 and V2 above and below a broken vertebra. Following decompression of the spinal cord C, the fixator is inserted and extended to engage the spikes 6 and 7 in the respective vertebrae V1 and V2 and thereafter holds the spinal cord C decompressed. A staple 11 may be driven into vertebrae V1 and V2 as reinforcement and to prevent rotation of the central portion of the fixator.

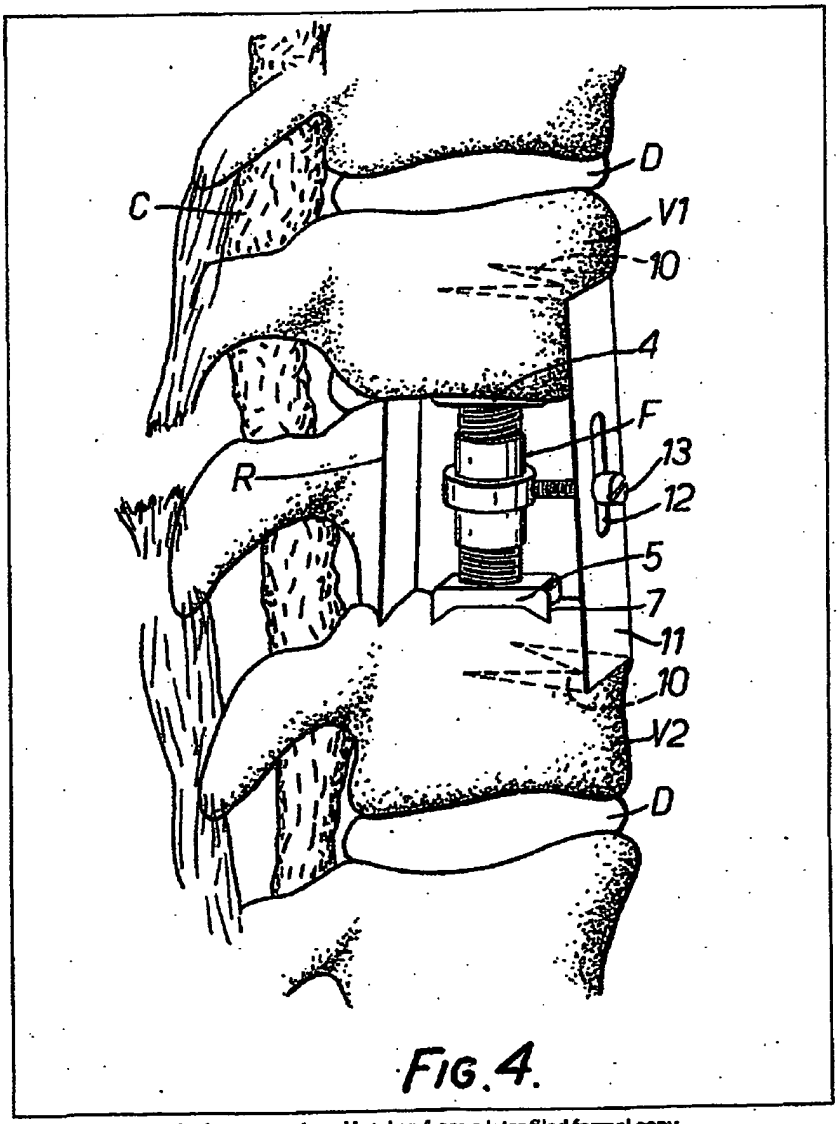

FIG. 4.

GB 2 083 754 A

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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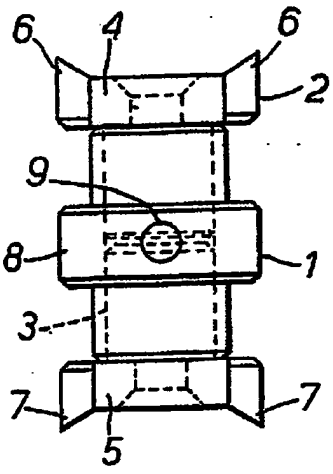

FIG. 1.

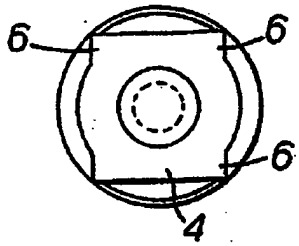

FIG. 2.

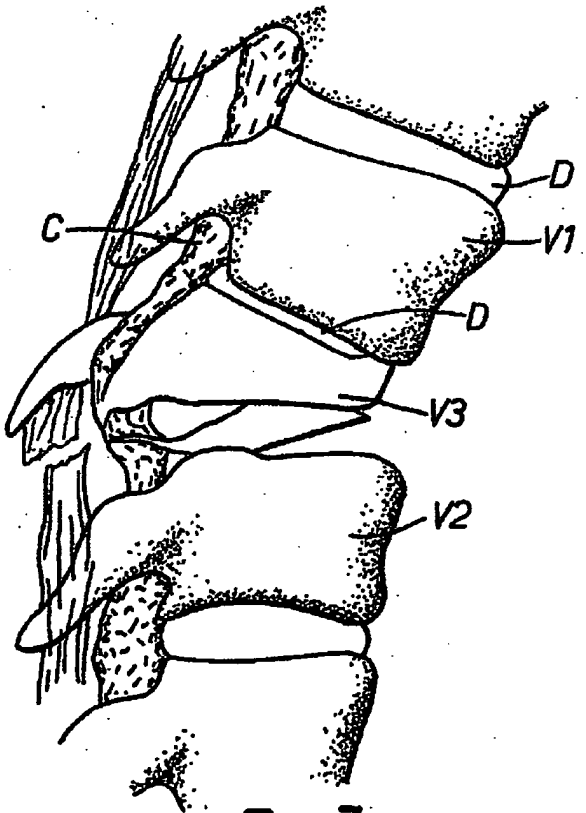

FIG. 3.

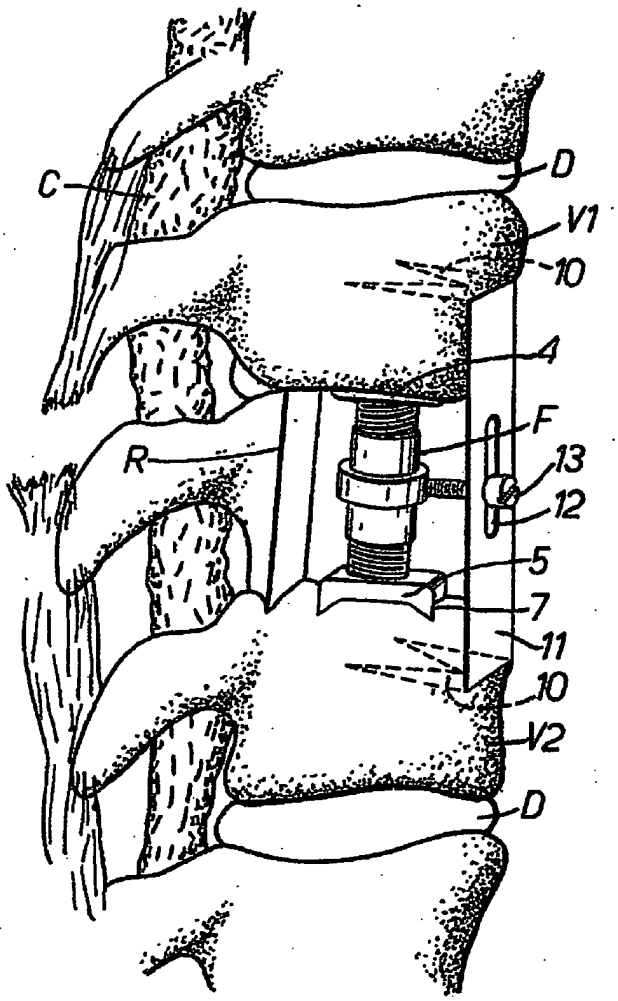

FIG. 4.

SPECIFICATION

A spinal fixator

This invention relates to a spinal fixator.

Surgical treatment for fracture over the spine has been known for very many years. However, various techniques have been used, with varying degree of success.

It would appear that laminoectomy is of no benefit in the management of spinal cord injury.

A simple plating and screw technique is known involving fixation on the spinal process, but, particularly where the spinal process is broke, does not prevent redislocation.

In recent years, spring stabilization, plate and screws fixation into the pedicle, and external fixation have all been tried.

It has become more widely accepted nowadays that stability of the spine materially affects the ability of the injured neural tissue to heal. Furthermore, commonly in spinal injury the cord will swell owing to biochemical change and, in the limited space of the canal, become squeezed. Moreover, a disc and ligaments are often ruptured and the cord compressed anteriorly. Therefore, in good management of spinal injury, not only stability of the spine but also decompression of the cord anteriorly are to be sought after.

According to the present invention, there is provided a spinal fixator, comprising first and second means having respective bearing portions for bearing against respective vertebral portions respectively above and below a broken vertebral portion and movable relative to each other, and adjusting means arranged to adjust the distance between said bearing portions for thereby setting the distance between said respective vertebral portions.

Owing to the invention, it is possible to achieve a high degree of stabilization of the spine and reliably to maintain decompression of the cord.

The fixator can replace the whole or part of a broken vertebra.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 shows a side elevation of an internal spinal fixator,

Figure 2 shows a plan view thereof,

Figure 3 shows a perspective view of a broken spine, and

Figure 4 shows a perspective view of the fixator in use of the spine.

Commonly, in fracture of the spine, one or more discs D and ligaments are ruptured and the spinal cord C is compressed anteriorly, as shown in Figure 3. Moreover, owing to biochemical change, the cord swells and, in the limited space of the canal, therefore becomes squeezed. It would therefore appear that, for correct management of spinal injury, not only is stabilization of the spine highly desirable, but also decompression of the cord C anteriorly is highly desirable.

Referring to Figures 1 and 2 the fixator is in the form of a turnbuckle. In practice, it is made of high quality stainless steel in three differing sizes. It consists of an internally threaded intermediate section 1 and upper and lower externally threaded end sections 2 and 3. The end sections 2 and 3 of course have their external threadings of opposite hand. Moreover, the sections 2 and 3 terminate as flat plates 4 and 5, respectively, formed with respectively upwardly and downardly protruding spikes 6 and 7, four for each plate. The middle 8 of the intermediate section 1 is of enlarged cross-section externally and is formed with two threaded holes 9 for receiving a tommy bar. By turning of the intermediate section 1 relative to the end sections 2 and 3, the turn-buckle can be extended by about half its length from its condition of minimum extension.

The use of the fixator will now be described with reference to Figures 3 and 4.

Through a standard antero-lateral approach, the signal fracture is exposed. Any ruptured disc, ruptured ligaments, broken bone fragments, and so on are removed. The spinal cord C is completely decompressed. Between the vertebrae V1 and V2 immediately above and immediately below the broken vertebra V3 is inserted the fixator F. The fixator F is extended until the spikes 6 and 7 are engaged firmly in the bone of the vertebrae V1 and V2, the flat bones 4 and 5 preventing excessive penetration into the bone. It is desirable that there should be inserted in addition to the fixator F a piece of rib R for biological bridging of the vertebra V3.

Even more reliable stabilization can be achieved by driving into the vertebrae V1 and V2 the respective sharp forked ends 10 of a sheet metal staple 11 formed with a central vertical slot 12 which receives the shank, but not the head, of a bolt 13 which is screwed into one of the threaded holes 9. The staple 11 not only connects the vertebrae V1 and V2 more stably together but the bolt 13 prevents rotation of the section 1 relative to the sections 2 and 3.

The fixator described above can be used with safety to immobilise securely the spine to facilitate nursing and rehabilitation procedures. It also decompresses the spinal cord to give the cord the maximum chance of recovery from any damage.

Use of the fixator described has a great advantage in that patients can be discharged from hospital between two and four weeks from the fixation operation, even if prior to the operation they were paralyzed in both legs owing to the compression of the spinal cord.

CLAIMS

1. A spinal fixator, comprising first and second means having respective bearing portions for bearing against respective vertebral portions respectively above and below a broken vertebral portion and movable relative to each other, and adjusting means arranged to adjust the distance between said bearing portions for thereby setting the distance between said respective vertebral portions.

2. A fixator according to claim 1, wherein said first and second means and said adjusting means are provided by upper and lower and intermediate

sections, respectively, of a turnbuckle.

3. A fixator according to claim 2, wherein the upper and lower sections terminate at their upper and lower ends, respectively, in respective approximately horizontally extending surfaces with respectively upwardly and downwardly protruding sharp projections.

4. A fixator according to claim 2 or 3, wherein the intermediate section is formed with approximately radial holes for receiving a tommy bar.

5. In combination, a fixator according to claim 2 or 3, a staple for bridging said respective vertebral portions, and connecting means for connecting said staple to said intermediate section to prevent rotation of said intermediate section relative to said upper and lower sections and said staple.

6. A combination according to claim 5, wherein said intermediate section is formed with approximately radial threaded holes for receiving a tommy bar, said connecting means comprises an externally threaded elongate element for screwing into one of the threaded holes, and said staple is formed with an aperture therethrough for closely receiving said element.

7. A spinal fixator, substatially as hereinbefore described with reference to the accompanying drawings.

8. In combination, a spinal fixator and a staple, substantially as hereinbefore described with reference to the accompanying drawings.

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